

PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference E38610 JFL/JOB	FOR FURTHER ACTION See Form PCT/IPEA/416	
International application No. PCT/NO2005/000083	International filing date (day/month/year) 07-03-2005	Priority date (day/month/year) 11-03-2004
International Patent Classification (IPC) or national classification and IPC See Supplemental Box		
Applicant Tomra Systems ASA et al		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 4 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
 - a. ☒ (sent to the applicant and to the International Bureau) a total of 8 sheets, as follows:
 - ☒ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
 - ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
 - b. ☐ (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) _____, containing a sequence listing and/or tables related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

- | | | |
|-------------------------------------|--------------|---|
| <input checked="" type="checkbox"/> | Box No. I | Basis of the report |
| <input type="checkbox"/> | Box No. II | Priority |
| <input type="checkbox"/> | Box No. III | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability |
| <input type="checkbox"/> | Box No. IV | Lack of unity of invention |
| <input checked="" type="checkbox"/> | Box No. V | Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |
| <input type="checkbox"/> | Box No. VI | Certain documents cited |
| <input type="checkbox"/> | Box No. VII | Certain defects in the international application |
| <input type="checkbox"/> | Box No. VIII | Certain observations on the international application |

Date of submission of the demand 05-10-2005	Date of completion of this report 17-05-2006
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Form PCT/IPEA/409 (cover sheet) (April 2005)

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of: **Cover sheet**

International patent classification (IPC)

B65G 47/40 (2006.01)

B07C 5/34 (2006.01)

Box No. I Basis of the report

1. With regard to the language, this report is based on:



the international application in the language in which it was filed

a translation of the international application into _____,
which is the language of a translation furnished for the purposes of:

international search (Rules 12.3(a) and 23.1(b))



publication of the international application (Rule 12.4(a))



international preliminary examination (Rules 55.2(a) and/or 55.3(a))

2. With regard to the elements of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

the international application as originally filed/furnished



the description:

pages 3 - 8 as originally filed/furnishedpages* 1 - 2 received by this Authority on 07-04-2006

pages* _____ received by this Authority on _____



the claims:

pages _____ as originally filed/furnished

pages* _____ as amended (together with any statement) under Article 19

pages* 1 - 6 received by this Authority on 07-04-2006

pages* _____ received by this Authority on _____



the drawings:

pages 1 - 14 as originally filed/furnished

pages* _____ received by this Authority on _____

pages* _____ received by this Authority on _____



a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

the description, pages _____



the claims, Nos. _____



the drawings, sheets/figs _____

the sequence listing (*specify*): _____any table(s) related to the sequence listing (*specify*): _____4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

the description, pages _____



the claims, Nos. _____



the drawings, sheets/figs _____

the sequence listing (*specify*): _____any table(s) related to the sequence listing (*specify*): _____

* If item 4 applies, some or all of those sheets may be marked "superseded."

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/NO2005/000083

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	<u>1-20</u>	YES
	Claims		NO
Inventive step (IS)	Claims	<u>1-20</u>	YES
	Claims		NO
Industrial applicability (IA)	Claims	<u>1-20</u>	YES
	Claims		NO

2. Citations and explanations (Rule 70.7)

Documents cited in the International Search Report:

D1: EP 0 212 858 A1
D2: DE 43 29 193 A1
D3: US 5 628 08 A
D4: JP 7-185 476 A
D5: JP 10-000 434 A

The cited documents represent the general state of the art.
The invention defined in claims 1-20 is not disclosed by any of these documents.

The cited prior art does not give any indication that would lead a person skilled in the art to the claimed method and device for individually transporting articles. The method and device comprises the features of identifying each article prior to placing them one by one in a container and verifying that there is only one article per container. The articles are then discharged at a delivery location designated for each article. Therefore, the claimed invention is not obvious to a person skilled in the art.

Accordingly, the invention defined in claims 1-20 is novel and is considered to involve an inventive step. The invention is industrially applicable.

A method and a device for transporting identified packaging units

The present invention relates to a method and a device for individually transporting articles of different type, size, weight, material or shape, to one delivery location of a plurality of delivery locations that is designated for the respective article, as disclosed in more detail in the preambles of attached claims 1, 3, 4, 11, 13 and 14.

To illustrate the prior art, reference is made to patent documents EP-B1-0212858, DE-A1-4329193, US-A-5628408, JP-A-7-185476, JP-A-10-000434, JP-10-174936, EP-B1-0532028, , US-A-4465177 and EP-A1-0593374.

There are also previously known solutions in which packaging units, after identification, are movable by conveyor belts to delivery points that have gates, movable guides, drop doors or the like to divert an identified packaging unit to a designated delivery point.

Such known solutions are often mechanically complex and thus costly, and it has been an object of the present invention to be able to indicate a solution that is based on a continuously moving conveying system which is readily adaptable to the need for delivery locations, and which is mechanically simple in its structure and consists of few parts of different types. Thus, the object of the invention is to provide a solution that is easy to maintain, reliable in operation and inexpensive.

According to the invention, the method comprises the steps as defined in the independent claims 1, 3 and 4.

Additional embodiments of the method are set forth in attached, subsidiary claims 2 and 5 – 10.

The aforementioned device comprises, according to the invention, the characteristic features as defined in the independent claims 11, 13 and 14.

Additional embodiments of the device are set forth in attached, subsidiary claims 12 and 15 - 20.

The invention will now be explained in more detail with reference to the attached figures which show exemplary embodiments that are non-limiting for the invention.

Fig. 1 is a perspective view of the basic structure of a currently preferred embodiment of the device according to the invention.

Fig. 2 is a perspective view of the device from another angle.

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Fig. 3 is an enlarged, side elevational view of a modification of the device seen in Figs. 1 and 2.

Fig. 4 is a block diagram of the signal structure of the device according to the invention.

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Fig. 5 shows detail of the device in connection with a non-activated control means.

Fig. 6 shows detail of the device in connection with an activated control means, and Fig. 7 shows further details in connection with a toothed engaging element for controlled inversion of a transport container.

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Figs. 8-11 shows further details in connection with the inversion of a transport container.

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Fig. 12 is a perspective view of the toothed engaging element.

Fig. 13 is a perspective view of detail of bearing and guide pins on a transport container.

P a t e n t c l a i m s

1.

A method for individually transporting articles (1; 2; 87;109) of different type, size,
5 weight, material or shape, to one delivery location of a plurality of delivery locations (3,
4, 5; 6, 7) that is designated for the respective article, characterised in the steps of:

- identifying each article (1; 2; 87; 109) as regards its type of material prior to
placing the identified articles one by one in a respective one of a plurality of transport
containers (10; 60; 74, 79; 82; 99),

10 - providing television camera inspection of the articles one by one from a location
above the transport path of the articles (1; 2; 87;109) to establish that just one article is
placed or is present in a respective dedicated transport container, and

- causing the respective article (1; 2) at its designated delivery location to be
discharged from its transport container to a collecting or storage bin, disintegrator or
15 further conveyor (3, 4, 5; 6, 7) dedicated to the article; said discharge of the article from
the container being made under the effect of gravity or with the aid of a separate,
controlled actuating means.

2.

20 A method according to claim 1, wherein the transport container (10) at the designated
delivery location is made to invert in the course of rotating the container through an
angle of 360° about an axis of rotation so as to discharge the single article from the
container under the effect of gravity.

25 3.

A method for individually transporting articles (1; 2; 87;109) of different type, size,
weight, material or shape, to one delivery location of a plurality of delivery locations (3,
4, 5; 6, 7) that is designated for the respective article, characterised in the steps of:

- identifying each article (1; 2; 87; 109) as regards its type of material prior to

30 placing the identified articles one by one in a respective one of a plurality of transport
containers (10; 60; 74, 79; 82; 99), and

- discharging the respective article (1; 2) at its designated delivery location from its
transport container to a collecting or storage bin, disintegrator or further conveyor (3, 4,
5; 6, 7) dedicated to the article, said discharging provided by inverting the transport
35 container (10) in the course of rotating the container through an angle of 360° about an
axis of rotation so as to discharge the single article from the container under the effect
of gravity.

4.

A method for individually transporting articles (1; 2; 87;109) of different type, size, weight, material or shape, to one delivery location of a plurality of delivery locations (3, 4, 5; 6, 7) that is designated for the respective article, characterised in the steps of:

- 5 - placing identified articles (1; 2; 87; 109) one by one in a respective one of a plurality of transport containers (10; 60; 74, 79; 82; 99),
- discharging the respective article (1; 2) at its designated delivery location from its transport container to a collecting or storage bin, disintegrator or further conveyor (3, 4, 5; 6, 7) dedicated to the article, said discharging provided by inverting the transport
- 10 container (10) in the course of rotating the container through an angle of 360° about an axis of rotation so as to discharge the single article from the container under the effect of gravity, the rotation of the transport container being controlled by a plurality of guide pins (41, 45 – 47) on the container (10), at least one (41) of the guide pins , on cooperation with a movable and selectively controllable guide flap (15; 16; 17) mounted
- 15 at the delivery location, causing an initial turning of the container, and at least one further guide pin (45 -47) on the container in cooperation with a stationary toothed engaging element (40; 48 -52) at the delivery location causing controlled rotation of the container.

20 5.

A method according to claim 1, wherein further television camera inspection of the transport containers includes at least one of:

- i) determining that discharging of an article (1; 2; 87;109) at designated article delivery location causes the transport container to be fully emptied,
- 25 ii) determining that the article (1; 2; 87;109) is not a strange article, and
- iii) determining that the article (1; 2; 87;109) is in a unitary state when in its container.

6.

A method according to claim 1 or 5 , wherein said television camera inspection is made

30 from a location above the transport path of the articles.

7.

A method according to claim 2 or 3, wherein rotation of the transport container is performed in a controllable manner and temporally actuated by force.

35

8.

A method according to one of claims 1,2 or 3, wherein the transport containers are prevented from rotation in horizontal portions of the circular path, except at the designated article delivery location related to a specific container, by allowing guide pins (41) on both sides of the container to form anti-rotation supports.

9.

A method according to claim 2, wherein the rotation of the transport container is controlled by a plurality of guide pins (41, 45 - 47) on the container (10), where at least one (41) of the guide pins, on cooperation with a movable and selectively controllable guide flap (15; 16; 17) mounted at the delivery location, causes an initial turning of the container, and wherein at least one further guide pin (45 -47) on the container in cooperation with a stationary toothed engaging element (40; 48 -52) at the delivery location causes controlled rotation of the container.

10.

A method according to claim 1, wherein said identification is made of articles being empty packaging units elected from the group of cans (2) of metal or plastic, and bottles (1; 87; 109) of plastic or glass.

11.

A device for individually transporting articles (1; 2; 87;109) of different type, size, weight, material or shape to one delivery location (3, 4, 5; 6, 7) of a plurality of delivery locations that is designated for the respective article, a plurality of transport containers (10; 60; 74, 79; 82; 99) being arranged to move in spaced apart relation along a transport path as an endless, moving row of containers, characterised in :

- an article recognition means (20, 22, 23) for identifying each article as regards its type of material prior to a location at which the articles are to be placed one by one in a respective transport container to yield only one article per container;

- at least one television camera which is located to inspect the articles one by one to establish that just one article is placed or is present in a respective dedicated transport container;

and

- a container actuating means (15 -17; 61; 81; 88-92; 93-96; 107,108) mounted at each of said plurality of said delivery locations, a respective one of said actuating means in one state capable of entering into activated position related to a designated delivery location for an identified article, to cooperate with a respective transport container so as

to cause removal of the identified article from the container at its designated delivery location, said actuating means in a second state controllable to be in an inactive position to selectively allow a container to pass the delivery location related to said respective actuating means when a container contains an article not designated for delivery
5 thereat.

12.

A device according to claim 10, wherein

- that the transport container (10) at a delivery location designated for an article is
10 arranged to cooperate with a means (15; 16; 17) at the delivery location for emptying the transport container in the course of rotating the container through a 360° about an axis of rotation thereof so as to discharge the article under the effect of gravity.

13.

- 15 A device for individually transporting articles (1; 2; 87;109) of different type, size, weight, material or shape to one delivery location (3, 4, 5: 6, 7) of a plurality of delivery locations that is designated for the respective article, a plurality of transport containers (10; 60; 74, 79; 82; 99) being arranged to move in spaced apart relation along a transport path as an endless, moving row of containers, said device
20 characterized in:

- an article recognition means (20, 22, 23) for identifying each article as regards its type of material prior to a location at which the articles are to be placed one by one in a respective transport container to yield only one article per container;
- a container actuating means (15 -17; 61; 81; 88-92; 93-96; 107,108) for discharging
25 the respective article (1; 2) at its designated delivery location from its transport container to a collecting or storage bin, disintegrator or further conveyor (3, 4, 5; 6, 7) dedicated to the article, said discharging means causing the transport container (10) to rotate through an angle of 360° about an axis of rotation, so as to discharge the single article from the container under the effect of gravity.

30

14.

- A device for individually transporting articles (1; 2; 87;109) of different type, size, weight, material or shape to one delivery location (3, 4, 5: 6, 7) of a plurality of delivery locations that is designated for the respective article, a plurality of transport
35 containers (10; 60; 74, 79; 82; 99) being arranged to move in spaced apart relation along a transport path as an endless, moving row of containers, said device characterized in:

- an article recognition means (20, 22, 23) for identifying each article (1; 2; 87; 109) as regards its type of material prior to a location at which the articles are to be placed one by one in a respective transport container to yield only one article per container;
- a container actuating means (15-17; 61; 81; 88-92; 93-96; 107,108) causing
- 5 discharging of a respective article (1; 2) at its designated delivery location from its transport container to a collecting or storage bin, disintegrator or further conveyor (3, 4, 5; 6, 7) dedicated to the article by inverting the transport container (10) in the course of rotating the container through an angle of 360° about an axis of rotation so as to discharge the single article from the container under the effect of gravity,
- 10 - said container actuating means (15-17; 61; 81; 88-92; 93-96; 107,108) including a plurality of guide pins (41; 44-47) on the container for controlling the rotation of the transport container, at least one (41) of the guide pins being configured, upon cooperation with said actuating means (15; 16; 17) in the form of a moving guide flap located at the delivery location, to cause an initial turning of the container, and at least
- 15 one additional guide pin (44-47) on the container being configured to co-operate with a toothed engaging element (40; 48-52) located stationary at the delivery location (3, 4, 5; 6, 7) to effect controlled rotation of the transport container.

15.

- 20 A device according to anyone of claims 11 - 14, wherein the transport containers have guide pins (41) on both sides of the container which form anti-rotation supports in at least parts of the horizontal portions of the transport path.

16.

- 25 A device according to claim 11, 12 or 13,
- wherein a plurality of guide pins (41; 44-47) are provided on the container for controlling the rotation of the transport container, wherein at least one (41) of the guide pins is arranged, upon cooperation with said actuating means (15; 16; 17) in the form of a moving guide flap located at the delivery location, to cause an initial turning of the
- 30 container, and wherein at least one additional guide pin (44-47) on the container is designed to co-operate with a toothed engaging element (40; 48-52) located stationary at the delivery location (3, 4, 5; 6, 7) to effect controlled rotation of the transport container.

17.

A device according to claim 11, wherein said at least one television camera is placed above said transport path of the articles and cooperative with the article recognition means in order to establish at least one of the following further features:

- 5 discharging of an article (1; 2; 87;109) at designated article delivery location causes the transport container (10; 60; 74, 79; 82; 99) to be fully emptied,
the article (1; 2; 87;109) is not a strange article, and
the article (1; 2; 87;109) is in a unitary state when in its container (10; 60; 74,
10 79; 82; 99).

18.

- A device according to claim 11 or 17, wherein said at least one a television camera is linked to the article recognition means to provide inspection of the articles (1; 2;
15 87;109) from a location above the transport path of the articles.

19.

- A device according to anyone of claims 11 – 18, wherein the transport containers (10; 60; 74, 79; 82; 99) are designed to receive articles (1; 2; 87;109) in the form of empty
20 packaging units elected from the group of : a) cans of metal or plastic, and b) bottles of plastic or glass.

20.

- A device according to anyone of claims 11 – 19,
25 - wherein a pair of chains or lines (29, 30; 62, 63; 77, 78; 85, 86; 104, 105) are provided to drive the containers (10; 60; 74, 79; 82; 99) through the transport path, said pair of chains or lines interacting with two pulling, rigidly interconnected, powered drive wheels (25; 26) around which the chains or lines are partly run;
- wherein holders (32, 33) on the chains or lines are designed for successive
30 cooperation with corresponding recesses (25'; 26'; 34'; 35'; 36'; 37'; 38'; 39') in respective guide wheels (25; 26; 34; 35; 36; 37; 38; 39) for synchronous movement of said chains or lines; and
- wherein at least some of opposite pairs of said holders provide support for a pair of bearing pins (31) on the containers.